A Sierra Monitor Company

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8700-123
HACH Ultra Analytics
(formerly Pacific Scientific Instruments)
Standard Protocol FX (enhanced) - ENG110
Developed for interfaces to
MetOne Particle Counters

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after May 1, 2001

Driver Version:	**1.00**
Document Revision:	**3**

TABLE OF CONTENTS

1. MetOne Particle Counter Serial Description

The MetOne Particle Counter Serial driver allows the FieldServer to transfer data to and from devices over RS-232 or RS-485 using MetOne Particle Counter Serial protocol.

This driver is based on a specification called "Standard Protocol FX (enhanced)" ENG110 Revision A dated 1999 by Pacific Scientific Instruments. This protocol provides an interface to Particle Counters manufactured by HACH Ultra Analytics and labeled as METONE products. Pacific Scientific Instruments is a former name of Hach.

The primary purpose of the driver is to obtain the current particle counts, but it does allow for limited control and configuration of some counter parameters. While the driver provides Client and Server emulation, the Server side of the driver is intended to support FieldServer's Quality Assurance program and is not intended to provide complete emulation of a MetOne Counter. Thus the Server side is not fully documented and is not supported. At a customer's request the Server side functionality can be documented and enhanced. If you are interested in this functionality, then please contact FieldServer's sales group.

When configured as a Client the driver can start/stop a unit from sampling, change its mode, set and get sample and hold times, startup or standby a unit and retrieve its current sample value. Whenever the driver stores a sample value, it will also store a timestamp of when the record was obtained.

In the configuration of the FieldServer each device is identified by specifying its device number then the sub-device code or port number and finally by a device type. The device type will be used to interpret the status byte obtained from the device.

For each configured node, each time the FieldServer sends a message to the device it will select the device (and the select the sub-device or port if specified) and then the message will be sent. If the most recent message sent was sent to the device, the driver will do the selection to ensure the correct device response.

When the current record is read from a device then the driver will store the data extracted from the response in a range of consecutive Data Array elements so that these values can be served to another protocol. Even though the record data contains a time stamp, the driver will make its own time stamp for new data. If there is no current record the driver will not update the data.

If the response is invalid in any way – invalid characters or invalid checksum the driver will ignore the message and not store any data.

Max Nodes Supported

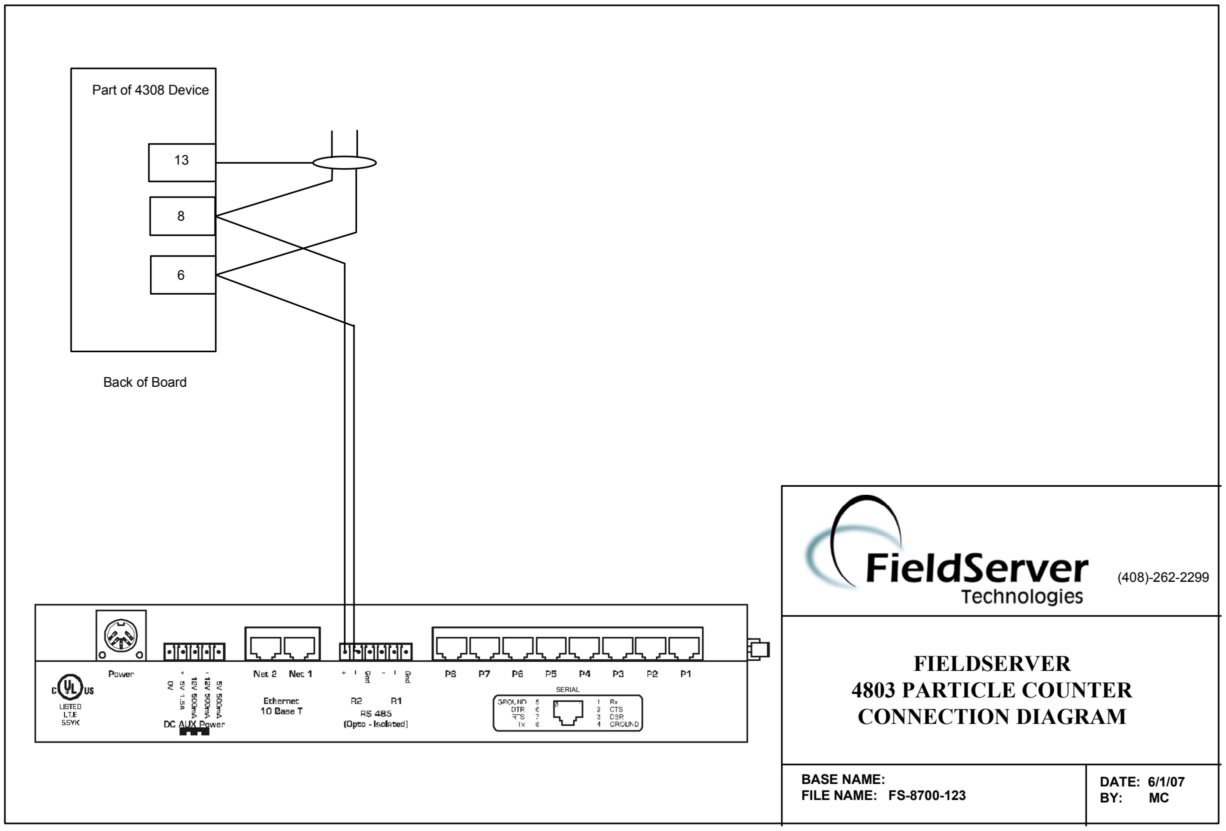
FieldServer mode	Nodes	Comments
Client	1	There can only be one Client node per FieldServer port. The driver can poll any number of Server nodes provided that they comply with the vendors numbering requirements
Server		Driver as a Server is not documented or supported. Used only for QA purposes.

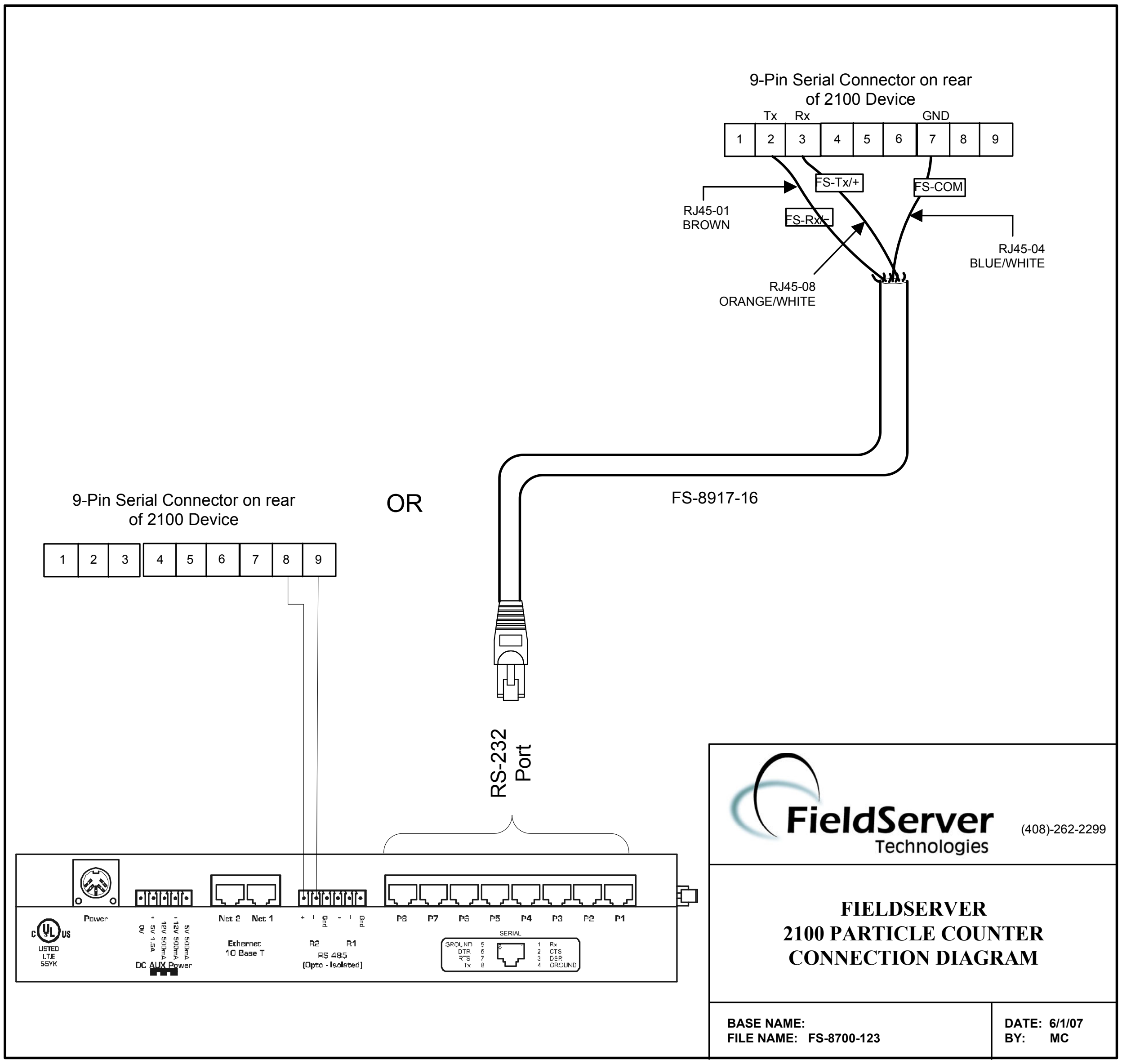
2. Driver Scope of Supply

2.1. Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	**Description**
FS-8915-16	UTP cable (7 foot) with Pigtail
FS-8917-02	RJ45 to DB9F connector adapter
FS-8700-123	Driver Manual.

3. Hardware Connections





3.1. Hardware Connection Tips / Hints

The 2100 Device auto configures its serial port based on the pins connected. There is no explicit setting or selector for RS-232/RS-485

Ensure other pins are not connected.

The FS-8917-16 cable is not needed for RS-485 on the X30 and X40 only.

4. Configuring the FieldServer as a MetOne PC Serial Client

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See ".csv" sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a MetOne Particle Counter Serial Server.

4.1. Data Arrays/Descriptors

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for MetOne Particle Counter Serial communications, the driver independent FieldServer buffers need to be declared in the "Data Arrays" section, the destination device addresses need to be declared in the "Client Side Nodes" section, and the data required from the Servers needs to be mapped in the "Client Side Map Descriptors" section. Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the bold legal value being the default.

Section Title		
Data_Arrays		
Column Title	**Function**	**Legal Values**
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Array_Format	Provide data format. Each Data Array can only take on one format.	Float, Bit, UInt16, SInt16, Packed_Bit, Byte, Packed_Byte, Swapped_Byte
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array.	1-10,000

Example

```
//    Data Arrays

Data_Arrays
Data_Array_Name,            Data_Array_Format,     Data_Array_Length
DA_AI_01,                   UInt16,                200
DA_AO_01,                   UInt16,                200
DA_DI_01,                   Bit,                   200
DA_DO_01,                   Bit,                   200
```

4.2. Client Side Connection Descriptions

Section Title		
Connections		
Column Title	**Function**	**Legal Values**
Port	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2[1]
Protocol	Specify protocol used	MetOne
Baud*	Specify baud rate	**9600** (Vendor limitation).
Parity*	Specify parity	**None** (Vendor limitation)
Data_Bits*	Specify data bits	**8** (Vendor limitation)
Stop_Bits*	Specify stop bits	**1** (Vendor limitation)
Handshaking*	Specify hardware handshaking	RTS, RTS/CTS, **None**
Poll_Delay*	Time between internal polls	0-32000 seconds, **0.05 seconds**

Example

```
//      Client Side Connections

Connections
Port,     Protocol,      Baud,   Parity,   Handshaking,    Poll_Delay
P8,       MetOne,        9600,   None,      None,          0.100s
```

4.3. Client Side Node Descriptors

Section Title		
Nodes		
Column Title	**Function**	**Legal Values**
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	The 'Device' Number	1-64
Protocol	Specify protocol used	MetOne.
Connection	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2[1]
PLC_Type	Identifies for the driver the family of Particle Counters/Manifolds connected to.	"237 Family" "2408" or "Manifold" "4800" "HF CNC"

Example

```
Nodes
Node_Name,      Node_ID,     Protocol,    PLC_Type,      Connection
PLC 1,          1,           MetOne,      237 Family,    P8
```

[1] Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

4.4. Client Side Map Descriptors

4.4.1. FieldServer Related Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from "Data Array" section above
Data_Array_Offset	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Client Map Descriptor	RDBC, WRBC, WRBX

4.4.2. Driver Related Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
Length	Length of Map Descriptor	See Map Descriptor Example for recommended lengths
Met1_Function	Specify the function. Additional notes and explanations are provided in the examples.	"Current Record" "Hold Time" "Sample Time" "Mode" "Device Select" "SubDevice/Port Select" "Count"
Met1_SubDev_or_Port	This parameter as well as the "Address" parameter must be specified if a SubDevice or Port is being polled.	"Device" "SubDevice" "Port"
Address	This parameter is used to specify the SubDevice or Port number if either is being polled.	Port numbers: 0-63 SubDevice numbers: 1-64
Met1_Label	A method of storing count data using a 3-character label. Use of this parameter to allows the driver to know which count to store. Refer to Section 0 for more information.	E.g. "LOC" or "0.1"

4.4.3. Timing Parameters

Column Title	Function	Legal Values
Scan_Interval	Rate at which data is polled	≥0.001s

4.5. Map Descriptor Example 1 – Read Hold (or Sample) Times from a Device.

In this example the driver reads the hold time from the field device. The time is stored in 3 consecutive Data Array elements. To read Sample Times simply change the Met1_Function to 'Sample Time. The driver extracts the time from the response and stores the hours at the specified offset, the minutes in the next Data Array location and the seconds in the 3rd location.

```
//   Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,   Data_Array_Name,   Data_Array_Offset,   Function,   Node_Name   Met1_Function,   Length,   Scan_Interval
Read_Time,             DA_TIMES,          0,                   RDBC,       MET1,       Hold Time ,      3,        5.0s
```

While not mandatory, giving each Map Descriptor a unique name will help to diagnose configuration problems.

When a response is received the driver extracts the data and stores it in the Data Array named here starting at the location specified by the offset parameter.

Tells the driver to Read continuously.

The name of the Node. The driver uses this name to link the Map Descriptor to a Node Descriptor (where it finds the Device Number specified with the Node_ID parameter). The Node Descriptor provides a link to the connection.

Tells the driver to read the Hold Time from the field device.

Reserves 3 Data array locations for storing data.

This task must be executed every 5 seconds.

4.6. Map Descriptor Example 2 – Write Hold (or Sample) Times to a Device.

In this example the driver writes the hold time to the field device. The time is specified in seconds. A max of 23 hours 59 minutes and 59 seconds can be specified. To write Sample Times simply change the Met1_Function to 'Sample Time. The driver extracts the time from the response and stores the hours at the specified offset, the minutes in the next Data Array location and the seconds in the 3rd location.

```
//    Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,    Data_Array_Name,    Data_Array_Offset,    Function,    Node_Name    Met1_Function,    Length
Write_Time,             DA_TIMES,           0,                    WRBX,        MET1,        Hold Time ,       1
```

The driver will extract the time in seconds from the Data Array specified here and use it to form the command message to the field device.

The location in the Data Array

This function 'wrbx' tells the driver to only send the command each time the value found in the specified DA:offset is updated. Update means each time some other protocol writes to this DA:offset

Change this to 'Sample Time' to command a sample time or make two Map Descriptors – each with the correct time function.

Tells the FieldServer that one element of the data array is reserved for this Map Descriptor.

4.7. Map Descriptor Example 3 – Read the operating mode.

In this example the driver reads the operating mode from the field device. The driver stores a single element of data extracted from the response. The driver stores a 'C' to indicate the field device is counting, a 'H' to indicate the device is holding and an 'S' to indicate that it has stopped. If the mode is not recognized the driver store s a '?'. If another protocol reads these states from the FieldServer it will probably display the ASCII value corresponding to each mode letter: 'C'=67 'H'=72 and 'S'=83

```
//    Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,    Data_Array_Name,    Data_Array_Offset,    Function,    Node_Name    Met1_Function,    Length,    Scan_Interval
Write_Time,             DA_MODE,            0,                    rdbc,        MET1,        Mode ,            1,         1.0s
```

4.8. Map Descriptor Example 4 – Start / Stop Counting.

In this example the driver sends a command to start or stop the field device from counting based on the value found in the Data Array element. If the value is non-zero, the field device will be commanded to start counting. If the value is zero, the field device will be commanded to stop counting. In this example the function is set to wrbx which means the command message will be sent each time the value found at the specified offset in the specified Data Array is updated even if it is not changed.

```
//    Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,   Data_Array_Name,   Data_Array_Offset,   Function,   Node_Name   Met1_Function,   Length,   Scan_Interval
Write_Count_Mode,      DA_COUNT_CTRL,     0,                   wrbx,       MET1,       Count ,          1,        1.0s
```

Driver extracts one single value from this DA:Offset and uses the value to send a command to start counting (non-zero value) or stop counting (zero value)

Command is sent each time the value at DA:offset is updated.

Set length to 1 for this Met1 Function

When the function is wrbx then the scan interval parameter is ignored.

4.9. Map Descriptor Example 5 – Change Mode

In this example the driver sends a command to change the mode of the field device. The command sent is determined by the value found in the specified Data Array location. In this example the function is set to wrbx. This means the command message will be sent each time the value found at the specified offset in the specified Data Array is updated even if it is not changed

```
//    Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,     Data_Array_Name,    Data_Array_Offset,    Function,   Node_Name    Met1_Function,    Length,
Write_Mode,              DA_MODE_CTRL,       0,                    wrbx,       MET1,        Mode ,            1,
```

Driver extracts one single value from this DA:Offset and uses the value to send a command to change the mode.

Auto Sample Mode: Value=1
Manual Sample Mode: Value=2
Active Mode : Value = 3
Standby Mode: Value = 4
If the value found is not valid then no command is sent.

Set length to 1 for this Met1_Function

4.10. Map Descriptor Example 6 – Select Device

Device selection is handled automatically by the driver, and support for this message is provided mainly for testing purposes.

The driver uses the Node_ID parameter to learn the address/number of the device to be selected. Valid numbers are in the range 1...64. When the device responds the driver stores the device number the Data Array element specified in the configuration.

```
//    Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,    Data_Array_Name,    Data_Array_Offset,    Function,    Node_Name    Met1_Function,    Length,
Select Device,          DA_MODE_CTRL,       0,                    wrbx,        MET1,        Device Select,    1,
```

The Node_Name connects this Map Descriptor to the Node Descriptor and that is where the driver finds the Node_ID parameter.

Set length to 1 for this Met1_Function

4.11. Map Descriptor Example 7 – Read the Current Record

In this example the driver reads the current record and stores the values in the specified Data Array. A single record comprises the following data: status; date and time and a count for 1 or more locations. The driver has no advance knowledge of the number of count fields to expect in the response. It simply stores them in consecutive locations in the Data Arrays. To map these counts to an upstream protocol, the order of the count fields must be known. The driver can store a maximum of 20 count fields. The Map Descriptor length must be set to a value that allows for enough data to be stored bearing in mind that it requires 8 DA elements to store the status, date and time and period.

One of these Map Descriptors is required for each device from which the current record is to be read..

```
//    Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,    Data_Array_Name,   Data_Array_Offset,   Function,   Node_Name   Met1_Function,    Length,   Scan_Interval
Read Record,            DA_DATA,           0,                   Rdbc,       MET1,       Current Record,   20,       1.0s
```

Driver stores the current record information in the Data Array specified here, starting at the specified offset. The data is arranged as follows.

0	Status Byte
1	Date - Month
2	Date - Day
3	Date - Year
4	Time - Hours
5	Time - Minutes
6	Time - Seconds
7	Period
8	Count #1
9	Count #2
10	Count #3 …

The length must be set to a value large enough to store the 8 fixed data items and the variable number of count fields.

4.12. Map Descriptor Example 8 – Dumping the Current Record

This example is almost identical to the previous one. The one difference is that a secondary Data Array has been specified. When this is done, each time a response is received, in addition to the storage specified in the previous example, the driver dumps the response byte for byte the secondary Array. It is important to avoid overlaps in the secondary arrays if this feature is used on multiple Map Descriptors. We suggest that about 2-300 DA elements is made available for the dump and that the format of the secondary Data Array is ‘BYTE’

```
Map_Descriptors
Map_Descriptor_Name,  Data_Array_Name,  Data_Array_Offset,  DA_Byte_Name,  Function,  Node_Name  Met1_Function,   Length,  Scan_Interval
Read Record,          DA_DATA,          0,                  DA_DUMP,       Rdbc,      MET1,      Current Record,  20,      1.0s
```

A secondary Data Array is specified with the ‘DA_Byte_Name’ parameter. When this is done the driver stores the read current record response, byte for byte, in the secondary DA.

The length specified the amount of Data Array space reserved for primary storage and has no effect on the dump. Ensure that dumps don’t overlap each other.

4.13. Map Descriptor Example 9 – An alternate way of storing the current record.

This example is similar to the one in example 7 where the current record was read. Here passive Map Descriptors have been added to store specifically labeled count records in specific places. In addition to the normal storage of the response data, the driver examines the label which precedes each count value and looks for a matching Map Descriptor. Examples 7, 8 and 9 can be combined and the current record stored in all 3 ways.

In this example a number of passive Map Descriptors are related to the active RDBC Map Descriptor in that they belong to the same device (Node Names are the same and both the active and the passives are 'Device') as well as all being 'Current Record' Map Descriptors. When the driver receives a response to the poll sent by the active Map Descriptor, then it also looks for matching passive Map Descriptors. As it looks at the label information for each count info it searches for a Map Descriptor whose Met1_Label matches the count label. In this example those labels are "0.1" , "0.3" , "0.5" , "1.0" , "3.0" , "5.0", "10." , "FLO" and "LOC". If there was a count whose label was different from one of these then the driver would not find a matching Map Descriptor and thus would not perform this additional storage for that count.

Example: If the current record contained this fragment …0.1 000123 LOC 000009 STA 000101 … then the driver would use passive Map Descriptors to store the value 123 at offset 0 in the Data Array, store the value 9 at offset 8 in DA= DA_CURR_D01_LBL and would not perform additional storage of the value 101 because it cannot find a label = "STA" . However all these values would be stored in the Data Array called DA_CURR_01 as described in example 7.

```
Map_Descriptors
Map_Descriptor_Name ,Scan_Interval ,Data_Array_Name ,Data_Array_Offset ,Length ,DA_Byte_Name ,Function ,Node_Name ,Met1_Function  ,Met1_SubDev_or_Port
Rd_CurretVals       ,0s            ,DA_CURR_D01     ,0                 ,20     ,DA_DUMP_D01  ,Rdbc     ,MET1       ,Current Record ,Device

Map_Descriptors
Map_Descriptor_Name ,Scan_Interval ,Data_Array_Name ,Data_Array_Offset ,Length ,Function ,Node_Name ,Met1_Function  ,Met1_SubDev_or_Port  ,Met1_Label
Rd_CurretVals1      ,0s            ,DA_CURR_D01_LBL ,0                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,0.1
Rd_CurretVals2      ,0s            ,DA_CURR_D01_LBL ,1                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,0.3
Rd_CurretVals3      ,0s            ,DA_CURR_D01_LBL ,2                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,0.5
Rd_CurretVals4      ,0s            ,DA_CURR_D01_LBL ,3                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,1.0
Rd_CurretVals5      ,0s            ,DA_CURR_D01_LBL ,4                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,3.0
Rd_CurretVals6      ,0s            ,DA_CURR_D01_LBL ,5                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,5.0
Rd_CurretVals7      ,0s            ,DA_CURR_D01_LBL ,6                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,10.
Rd_CurretVals8      ,0s            ,DA_CURR_D01_LBL ,7                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,FLO
Rd_CurretVals9      ,0s            ,DA_CURR_D01_LBL ,8                 ,1      ,passive  ,MET1      ,Current Record ,Device               ,LOC
```

4.14. Map Descriptor Example 10 – Reading from a SubDevice/Port

If there is a requirement to read data from a specific sub-device or port., any of the preceding examples can be modified by specifying whether the message must be directed at a Sub Device or Port on a Device and also specifying the Sub Device or Port number. This is done by specifying the 'Met1_SubDev_or_Port' and 'Address' parameters. The same technique is used to write commands or times to SubDevices or Ports.

In this example the current record is read from the Sub Deice #3 on the device named Met1. The driver will use the device name to look up the Node_ID (or device number) on the device descriptor (see chapter 4.3Client Side Node Descriptors). The driver will select the device, select the sub device and finally will read the current record.

```
Map_Descriptors
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Node_Name  Met1_SubDev_or_Port, Address, Met1_Function,  Length, Scan_Interval
Read Record,         DA_DATA,         0,                 Rdbc,     MET1,      SubDevice,           3,        Current Record, 20,     1.0s
```

Driver will select this device. (Driver finds the device number by looking at the definition of the Node named MET1.)

Then driver will select 'SubDevice' number 3.

Use the keyword 'Port' to select a specific port.

Number SubDevices 1..64
Number Ports 0..63

Then driver will read the current record.

4.15. Map Descriptor Example 11 – Selecting a Sub-Device/Port

This procedure is automatic. Support for this message is provided for testing purposes only.

The driver uses the Address parameter to learn the number of the Sub-Device or Port to be selected.
When the device responds the driver stores the Sub-Device/ Port number the Data Array element specified in the configuration.

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name	Met1_SubDev_or_Port,	Address,	Met1_Function,	Length,
Select Device,	DA_MODE_CTRL,	0,	rdbc,	MET1,	Port,	0,	SubDevice/Port Select,	1,

Driver will send a port select message to the port specified with the address parameter.

When using this type of Map Descriptor, the driver does not send a device select message first.

Set Met1_Function = 'SubDevice/Port Select'

5. Configuring the FieldServer as a MetOne PC Serial Server

The Server side of the driver was developed to support FST's QA program. It is not documented or supported. If you are interested in using the driver to emulate a MetOne Particle Counter then contact the FST Sales group.

Appendix A. Driver Error Messages

Message	**Description**
MET1:#01 Err. Cant set mode to state=%d for MD=%s	An attempt was made to send a mode control command to a device. The required mode is derived from the Data Array value. This message is printed when the driver doesn't recognize the value found and thus cannot send the command. This can be resolved by having the upstream device send a valid value to the DA:offset associated with the reported MD. Refer to the example in section 4.9 for more information.
MET1:#02 Err. Cant set Sample time to zero. MD=%s	The reported Map Descriptor is being used to send a new Sample Time to the field device but the time found in the Data Aarray:offset specified on the Map Descriptor is zero. The driver cannot send a sample time of zero. This can be resolved by by having the upstream/other protocol send a non-zero value to the DA:Offset.
MET1:#03 Err. Cant set Holde time to zero. MD=%s	The reported Map Descriptor is being used to send a new Hold Time to the field device but the time found in the Data Array:offset specified on the Map Descriptor is zero. The driver cannot send a sample time of zero. This can be resolved by by having the upstream/other protocol send a non-zero value to the DA:Offset.
MET1:#04a/b Err. Invalid time string=%s MD=%s	Message 4a is printed when a response to a poll for the Sample/Hold time returned a response whose time cannot be correctly understood by the driver. If this error occurs rarely it may be a consequence of an occasional corruption. If it occurs consistently, take a log, ensure this event occurs at least once during the log and contact Tech Support. The FieldServer web site provide tools and instructions for taking logs. Message 4b is printed when the time is formatted correctly but found be an invalid time. The same considerations apply as with 4a.
MET1:#05 FYI. MD=%s too short to store all. Ignored stat incremented each time this happens. Play safe - set MD length=20.	This message is printed once and trhen suppressed. The Map descriptor is not long enough to store all data from the record..[2] Refer to section 4.11.
MET1:#06 Err. Cant store Current Record. Chksum err.	If a response to a read Current Record contains a checksum error the driver prints this message. If this error occurs rarely then it may be a consequence of an occasional corruption. If it occurs consistently, take a log, ensure this event occurs at least once during the log and contact Tech Support. The FieldServer web site provide tools and instructions for taking logs

[2] Update the configuration file, download the modified configuration file and reset the FieldServer for the changes to take effect.

Message	Description
MET1:#07 Err. Cant find DA=%s to get Mode. MET1:#07b Err. Cant find DA=%s to set Mode. MET1:#07c Err. Cant find DA=%s to get current record. MET1:#07d Err. Cant find DA=%s to store times.	Printed by the Server side of the driver. The Server cant find the specified DA which will be used to store incoming data or from which data will be extracted to form a response.[3]
MET1:#08a Err. Invalid time string=%s MET1:#08b Err. Invalid time string=%s	Printed by the Server side of the driver. See notes for #4.
MET1:#09a Err. Met1_Function=%d is unknown. MD=%s	The reported MD has a Met1 function not recognized by the driver. This should never happen. Take a log and send a copy of the log and your configuration to Tech Support. The FieldServer web site provide tools and instructions for taking logs
Met1:#10 FYI. No place to store label data. Label=%s MD=%s	This messages is printed a maximum of 15 times and then suppressed. Where the label method is being used to store data. (See section 4.13) then this message is printed if the driver can't find an Map Descriptor with a label which matches the reported label found in the message from the field device. The message is printed simply to alert users to what count labels are being returned. Passive Map Descriptors can be created to store the reported data, or the message could be ignored.
MET1:#11a Err. Diagnostic 6 MET1:#11b Err. Diagnostic 1 MET1:#11c Err. Diagnostic 4 MET1:#11d Err. Diagnostic 2 MET1:#11e Err. Diagnostic 7	Printed by the Server side of the driver. These are printed when internal diagnostics are triggered. This should never be the case in an operational system. Take a log and contact Tech Support. The FieldServer web site provide tools and instructions for taking logs
MET1:#12 FYI. Use an Array called <%s> to expose diagnostic info.	This message can be ignored. For more information read Appendix A.2

[3] Update the configuration file, download the modified configuration file and reset the FieldServer for the changes to take effect.

Message	Description
MET1:#13 Err. Node=%d cant be selected because not defined in config.	The reported device could not be selected because there isnt a node descriptor whose Node_ID matches the reported device.[4]
"Met1:#14 FYI Poll_Delay overridden to %d	The driver has set the default poll delay to the reported value. This setting can be overridden in the configuration file.[4]
Met1:#15 Err. Set MD Length=%d	The driver has determined that the Length parameter is too small. The reported length is the driver suggestion. [4]
Met1:#16 Err. Set MD Length	The parameter called Length must be specified for each Map Descriptor. It tells the FieldServer how much Data Array space to reserve. Review the Map Descriptor examples in this manual. [4]
MET1:#17 Err. MD too long, Max=%u	Review the Map Descriptor examples in this manual. [4]
MET1:#18 Err. Invalid Port=%d. Valid Range=0-63	Invalid entry for port.[4]
MET1:#19 Err. Invalid SubDevice=%d. Valid Range=1-64	Invalis entry for SubDevice[4]
MET1:#20 Err. Met1_Function not specified	The parameter "Met1_Function' must be specified for every Map Descriptor. Refer to Section 4.4.2 as well as Map Descriptor examples provided in Chapter 4.[4]
MET1:#21 Err. Met1_Function='%s' not recognized	

Appendix A.1. Driver Operating and Error Statistics

These notes outline any driver specific use of the normal driver operating stats documented in the FieldServer Configuration Manual.

- Timeouts : During normal polling, a timeout can mean that the field device did not respond to the select message, (or the sub-device select message) or did not respond to the poll for data or the command poll.
- Exception Stats: If the driver select a device , sub-device or port and the return code from the device is unexpected the this stat is incrmented by 1.
- Ignored Stats: If the current record is read and there is more data than can be stored than specified by the Length of the Map Descritor then this stat is incremented.
- The driver does not use the normal operating stats to count message and bytes received in response to select / sub select messages.

[4] Update the configuration file, download the modified configuration file and reset the FieldServer for the changes to take effect

Appendix A.2. Driver Exposed Operating and Error Statistics

In addition to the normal operating stats the driver can expose additional operating/error stats in a Data Array which can be monitored by a remote device.

A special Data Array name is required. The driver recognizes the Data Array by its name which must be "met1-stats"

The following example shows how this Data Array can be configured. This section of text can be copied directly into the CSV file.

```
Data_Arrays
Data_Array_Name,        Data_Format,        Data_Array_Length
Met1-stats,             UINT32,             1000
```

The driver stores the following data. The location in the data array is obtained by multiplying the port number by 100 and then using the location offset indicated in the table below.

Offset + x
*Where x = port_number*100*
Physical Port 1 = Port Number 2
Physical Port 2 = Port number 1

Offset	Description
1	Stores the select code of the most recently selected device - This is done by the Server side of the driver
2	Stores the select code of the most recently selected sub-device/port - This is done by the Server side of the driver
3	Stores the operating command code of the most recently commanded device/sub-device/port - This is done by the Server side of the driver
4	When the driver stores current record counts by label then the driver stores the 1st character of the label here. This gets overwritten each time new label data is stored.
5	See previous. 2nd Character.
6	See previous. 3rd Character.
7	See previous. 4th Character.
8	Increments by 1 each time driver stores using the label method.
9	Increments by 1 each time internal diagnostic 1 is triggered. Should be zero in operational systems.
10	Increments by 1 each time internal diagnostic 4 is triggered. Should be zero in operational systems.
11	Increments by 1 each time internal diagnostic 5 is triggered. Should be zero in operational systems.
12	Increments by 1 each time internal diagnostic 6 is triggered. Should be zero in operational systems.
13	Increments by 1 each time internal diagnostic 7 is triggered. Should be zero in operational systems.
14	Increments by 1 each time there is no response to a select message
15	Increments by 1 each time there is no response to a sub-device/port select message
16	Increments by 1 each time there is no response to a non select message
17	Increments by 1 each time a response has a checksum error. Only current record poll responses contain checksums.

Offset	**Description**
18	Increments by 1 each time the Client side sends a select message
19	Increments by 1 each time the Client side sends a sub-device select message
20	Increments by 1 each time the Client side sends a port select message
21	Stores the select code of the most recent select message sent by the Client
22	Stores the sub-device/port select code of the most recent sub-device/port select message sent by the Client
23	Each time Client side sends a message this stat increments by 1
24	Each time Client side sends a message this stat increments by the number of bytes in the message
25	Increments by 1 each time a complete response is received from the field device
26	Increments by the number of bytes contained in a complete response received from the field device

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